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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/750,489   | 12/31/2003  | Ki-Min Lee           | 20059/PIA31071      | 1804             |
| 34431  | 7590        | 07/08/2005           | EXAMINER            |                  |
| HANLEY, FLIGHT & ZIMMERMAN, LLC<br>20 N. WACKER DRIVE<br>SUITE 4220<br>CHICAGO, IL 60606 |             |                      | LEE, CALVIN         |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
|  |             |                      | 2818                |                  |

DATE MAILED: 07/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/750,489

Applicant(s)

LEE, KI-MIN

Examiner

Lee, Calvin

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-7 and 9-15 is/are rejected.
- 7) ☒ Claim(s) 2 and 8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

**OFFICE ACTION**

***Claim Rejections - 35 U.S.C. § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 (e) that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

2. Claims 1, 3-5, 7, 11-12, and 14-15 are rejected under 35 US.C 102(e) as being anticipated by *Rasmussen (US 2004/0262658)*.

a) *Rasmussen* discloses a method of fabricating an MIM capacitor of high capacitance in a semiconductor device, the method comprising the steps of:

- depositing an interlayer dielectric film 25 of PSG or TEOS on a metal line 52 [¶ 0039-0041]
- planarizing the interlayer dielectric film [see the top surface of the dielectric film]
- etching the dielectric film to form an MIM capacitor forming region 41 [Fig. 10]
- sequentially depositing a lower electrode 71, an insulator layer 72, and an upper electrode 73 on the interlayer dielectric film; wherein the insulator layer comprises Ta<sub>2</sub>O<sub>5</sub>, Al<sub>2</sub>O<sub>3</sub>, Si<sub>3</sub>N<sub>4</sub> [¶ 0043] and the upper electrode comprises ruthenium and platinum [¶ 0044].
- etching the lower and upper electrodes, the insulator layer to form the MIM [Fig. 11]

b) In re claims 9 and 10, *Rasmussen* suggests the interlayer dielectric layer being planarized by CMP or dry etch (i.e., etch back) [¶ 0043].

3. Claims 1, 3, 5-7, 9-10, and 12-13 are rejected under 35 US.C 102(e) as being anticipated by *Hackler et al (US 2005/0063140)*.

a) *Hackler et al* discloses a method of fabricating an MIM capacitor of high capacitance in a semiconductor device, the method comprising the steps of:

- depositing an interlayer dielectric film 120 of BPSG or TEOS on a metal line 130 [¶ 0025-0026]
- inherently planarizing the interlayer dielectric film [see the top surface of the dielectric film 120]
- etching the dielectric film to form an MIM capacitor forming region 135 [Fig. 2]

-sequentially depositing a lower electrode 140, an insulator layer 150, and an upper electrode 160 on the interlayer dielectric film; wherein the lower electrode comprises Ti, W and TiN [¶ 0029] and the insulator layer comprises Ta<sub>2</sub>O<sub>5</sub>, Al<sub>2</sub>O<sub>3</sub> and Si<sub>3</sub>N<sub>4</sub> [¶ 0035].

-etching the lower and upper electrodes, the insulator layer to form the MIM [¶ 0059-0060]

b) In re claims 14 and 15, *Hackler et al* suggests the electrode stack being planarized by CMP or etch back [¶ 0054].


***Allowable Subject Matter***

4. Claims 2 and 8 are objected to as being dependent upon rejected claims, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. Neither *Rasmussen* nor *Hackler et al* teaches or suggests a capacitance of the MIM capacitor being determined by controlling a thickness of the interlayer dielectric layer.

***Contact Information***

5. Any inquiry concerning this communication from the Examiner should be directed to *Calvin Lee* at (571) 272-1896 on Mondays thru Thursdays 6:30-4:30PM. If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2818's Supervisory Patent Examiner *David Nelms* can be reached at (571) 272-1787. The fax phone number for the organization (where this application is assigned to) is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system at <http://pair-direct.uspto.gov>. Should you have questions on access to the PAIR system, contact the Electronic Business Center at (866) 217-9197.



David Nelms  
Supervisory Patent Examiner  
Technology Center 2800

Date: June 30, 2005